To demonstrate that a log-log plot of the function cn^b has a slope b and x-intercept $\mathrm{l}ogc$, we follow these steps:

Log-Log Plot of cn^b

Given the function $\mathrm{f}(n) = cn^b$:

1. Take the logarithm of both sides: $\mathrm{l}og(f(n)) = log(cn^b)$
2. Use the properties of logarithms to separate the terms: $\mathrm{l}og(f(n)) = log(c) + log(n^b)$
3. Apply the power rule for logarithms ($\mathrm{l}og(a^b) = blog(a)$): $\mathrm{l}og(f(n)) = log(c) + blog(n)$

This equation is in the form $\mathrm{y} = mx + b$, which is the equation of a straight line where:

- $\mathrm{y} = log(f(n))$
- $\mathrm{x} = log(n)$
- $\mathrm{m} = b$ (the slope)
- $\mathrm{l}og(c)$ is the y-intercept.

Since this is a log-log plot, the slope of the line is b and the x-intercept occurs when $\mathrm{y} = 0$:

- To find the x-intercept, set $\mathrm{l}og(f(n)) = 0$: $0 = log(c) + blog(n)$

-$log(c) = blog(n)$

$\mathrm{l}og(n) = -\frac{log(c)}{b}$

Therefore, the x-intercept is: $\mathrm{l}og(n) = log(c^{-1/b})$

Application to $4n^3(\log n)^2$

Now let's apply this to the function $\mathrm{f}(n) = 4n^3(\log n)^2$:

1. Take the logarithm of both sides: $\mathrm{l}og(f(n)) = log(4n^3(logn)^2)$
2. Use the properties of logarithms to separate the terms: $\mathrm{l}og(f(n)) = log(4) + log(n^3) + log((logn)^2)$
3. Apply the power rule for logarithms: $\mathrm{l}og(f(n)) = log(4) + 3log(n) + 2log(log(n))$

This equation can be interpreted as a sum of linear terms on a log-log plot:

- The term $3log(n)$ indicates a slope of 3 for the n^3 part.

- The term $2log(log(n))$ does not affect the slope of the line on a standard log-log plot because it introduces a secondary logarithmic term.
- The term $\log(4)$ is a constant and contributes to the y-intercept.

Slope and X-Intercept

- **Slope**: The slope b is dominated by the term $3log(n)$, so the slope is 3.
- **X-Intercept**: The x-intercept is found by setting $\mathrm{y} = 0$ (where $\log(f(n)) = 0$) and solving for n: $0 = log(4) + 3log(n) + 2log(log(n))$ \textrm

This equation is complex due to the $2log(log(n))$ term. However, for large n, the $3log(n)$ term dominates, and the x-intercept is primarily influenced by the term involving n^3:

Setting $\log(4) + 3log(n) = 0$ for simplicity: $3log(n) = -log(4)$ $\log(n) = -\frac{log(4)}{3}$ Therefore, the x-intercept is: $\log(n) = log(4^{-1/3})$ $\log(n) = log(2^{-2/3}) \quad (\text{since } 4 = 2^2)$

So, the x-intercept in terms of n is $\mathrm{n} = 2^{-2/3}$.

In conclusion:

- The **slope** of the log-log plot for $4n^3(\log n)^2$ is 3.
- The **x-intercept** is influenced by the constant 4 but primarily dominated by the term involving n, simplifying to $\log(n) = -\frac{\log(4)}{3}$, or equivalently $\mathrm{n} = 2^{-2/3}$ in base 2 terms.